

## Summary

### S.1 INTRODUCTION

The end of the Cold War created a legacy of weapons-usable fissile materials both in the United States and the former Soviet Union. Substantial quantities of these materials, including plutonium (Pu) and highly enriched uranium (HEU), are no longer needed for defense purposes. Further agreements on disarmament between the United States and Russia may increase the surplus quantities of these materials. The global stockpiles of weapons-usable fissile materials pose a danger to national and international security in the form of potential proliferation of nuclear weapons and potential environmental, safety, and health consequences if the materials are not properly safeguarded and managed.

In September 1993, President Clinton issued the *Nonproliferation and Export Control Policy* in response to the growing threat of nuclear weapons proliferation. Further, in January 1994, President Clinton and Russia's President Yeltsin issued a *Joint Statement Between the United States and Russia on Nonproliferation of Weapons of Mass Destruction and Means of their Delivery*. In accordance with these policies, the focus of the U.S. nonproliferation efforts in this regard is five-fold: to secure nuclear materials in the former Soviet Union; to ensure safe, secure, long-term storage and disposition of surplus fissile materials; to establish transparent and irreversible nuclear reductions; to strengthen the nuclear nonproliferation regime; and to control nuclear exports.

To demonstrate the U.S. commitment to these objectives, the President announced on March 1, 1995, that 200 metric tons (t) (220 short tons [tons]) of U.S. fissile materials, 38.2 t (42.1 tons) of which is weapons-grade Pu (as stated in the Department of Energy's [DOE's] Openness Initiative of February 6, 1996), had been declared surplus to the U.S. nuclear defense needs. The United States is proceeding with plans and actions to ensure the continued safe, secure, and environmentally sound storage of its own weapons-usable fissile materials and is cooperating with Russia in an effort to reduce the risk of nuclear weapons proliferation. Additionally, DOE and its national laboratories have recently completed a joint study with Russia on technical options for the disposition of weapons-usable Pu.

*Weapons-Usable Fissile Materials*  
(Covered in the *Programmatic Environmental Impact Statement*)

All isotopes of Pu (except plutonium-238 [Pu-238]) and HEU that contain at least 20 percent uranium-235.<sup>1</sup>

A key element of DOE's decisionmaking is a thorough understanding of the environmental impacts that may occur during the implementation of the proposed action. The *National Environmental Policy Act* of 1969 (NEPA), as amended, requires Federal agencies to prepare an environmental impact statement (EIS) on all major Federal actions significantly affecting the quality of the human environment. In following this process, DOE has prepared the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement* (Storage and Disposition PEIS) to analyze various storage and disposition alternatives and to provide the necessary background, data, and analyses to help decisionmakers and the public understand the potential environmental impacts of each alternative. The results of the environmental analyses, together with information from technical and economic studies, nonproliferation analysis, and public input, will form the basis for DOE's decisions, which will be given in a Record of Decision (ROD) to be issued no sooner than

<sup>1</sup> Does not include spent nuclear fuel, irradiated targets, uranium-233, or Department of Defense (DoD) weapons program material in use.

30 days after publication of the Environmental Protection Agency's Notice of Availability of the Final PEIS. This process will also provide the United States with the basis and flexibility to implement Pu disposition efforts either multilaterally or bilaterally through negotiations or unilaterally as an example to Russia and other nations.

## THE PROPOSED ACTION

The Department proposes to take the following actions for U.S. weapons-usable fissile materials:

- Storage—provide a long-term storage system (for up to 50 years) for nonsurplus Pu and HEU that meets the Stored Weapons Standard<sup>2</sup> and applicable environmental, safety, and health standards while reducing storage and infrastructure<sup>3</sup> costs

### *Stored Weapons Standard*

The high standards of security and accounting for the storage of intact nuclear weapons should be maintained, to the extent practical, for weapons-usable fissile materials throughout dismantlement, storage, and disposition.

- Storage Pending Disposition—provide storage that meets the Stored Weapons Standard for inventories of weapons-usable Pu and HEU<sup>4</sup> that have been or may be declared surplus
- Disposition<sup>5</sup>—convert surplus Pu and Pu that may be declared surplus in the future to forms that meet the Spent Fuel Standard,<sup>2</sup> thereby providing evidence of irreversible disarmament and setting a model for proliferation resistance

### *Spent Fuel Standard*

The surplus weapons-usable Pu should be made as inaccessible and unattractive for weapons use as the much larger and growing quantity of Pu that exists in spent nuclear fuel from commercial power reactors.

The Department's inventories of Pu and HEU are located at a number of DOE sites, including Hanford Site (Hanford), Idaho National Engineering Laboratory (INEL), Lawrence Livermore National Laboratory (LLNL), Los Alamos National Laboratory (LANL), Oak Ridge Reservation (ORR), Pantex Plant (Pantex), Rocky Flats Environmental Technology Site (RFETS), and Savannah River Site (SRS). These weapons-usable fissile materials are divided into two categories: surplus and nonsurplus. Surplus materials include those the President

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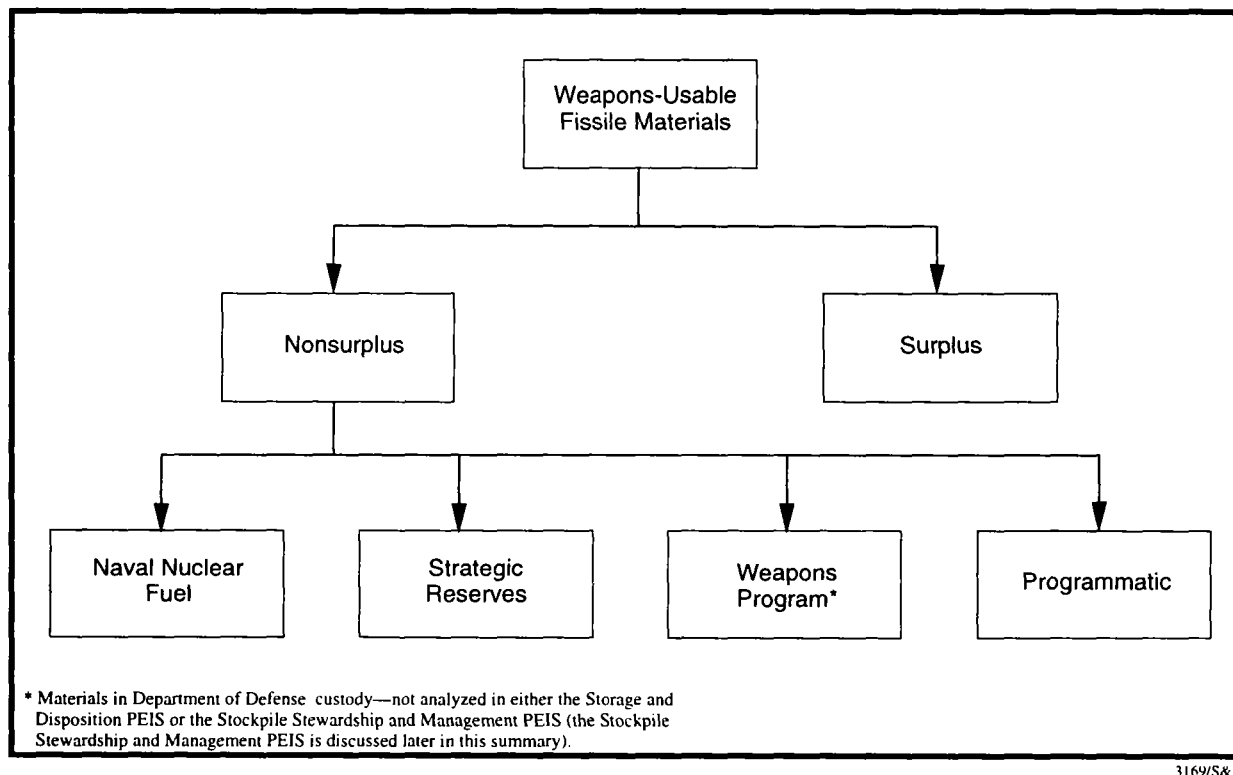
<sup>2</sup> Modified from *Management and Disposition of Excess Weapons Plutonium*, National Academy of Sciences, 1994.

<sup>3</sup> Includes electrical power, fuel, transportation network requirements, and safeguards/security.

<sup>4</sup> The Storage and Disposition PEIS covers long-term storage of nonsurplus HEU and storage of surplus HEU pending disposition. Until storage decisions are implemented, surplus HEU that has not gone to disposition will continue to be stored pursuant to, and not to exceed the 10-year interim storage time period evaluated in the *Environmental Assessment for the Proposed Interim Storage of Enriched Uranium Above the Maximum Historical Storage Level at the Y-12 Plant, Oak Ridge, Tennessee* (Y-12 EA) (DOE/EA-0929, September 1994) and Finding of No Significant Impact (FONSI).

<sup>5</sup> Disposition of surplus HEU is addressed in a separate document, the *Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement* (DOE/EIS-0240, June 1996).

has declared surplus to national defense needs in response to recommendations from the Nuclear Weapons Council (made up of representatives from DOE, the DoD, and the Joint Chiefs of Staff) and those that may be declared surplus in the future. The nonsurplus materials include naval nuclear fuel, strategic reserves, programmatic materials (non-weapons research and development [R&D], weapons R&D, and other programmatic materials), and weapons program materials in use, as shown in Figure S.1-1. Weapons program materials in use are not within the scope of the PEIS. The forms of the weapons-usable fissile materials are primarily pits and secondaries (weapons components bearing Pu and HEU, respectively) and metals and oxides of Pu and HEU.



3169/S&amp;D

**Figure S.1-1. Weapons-Usable Fissile Material Categories.**

## PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to implement the President's *Nonproliferation and Export Control Policy* in a safe, reliable, cost-effective, and timely manner. DOE is proposing a comprehensive program to accomplish this purpose by providing an exemplary long-term storage system for weapons-usable fissile materials, eliminating the stockpile of surplus weapons-usable Pu, and establishing the technical and program infrastructure that will provide for disposition of the surplus weapons-usable Pu in the United States.

The weapons-usable fissile materials declared surplus by the President (March 1995) are in various compositions and forms. A storage plan is needed to provide continued adequate control of these surplus materials and any that may be declared surplus in the future, from now through final disposition, as well as management and long-term storage of nonsurplus fissile materials that will not be subject to disposition. Approximately 89 t (98 tons) of Pu (reported in DOE's Openness Initiative on December 7, 1993) and 994 t (1,095 tons) of HEU (reported in DOE's Openness Initiative on June 29, 1994) were produced by the United States during the period its production facilities were in operation. Some of these materials have been used in weapons or for other programmatic purposes, some of the remainder have been declared surplus, and additional materials could be declared surplus in the future. Disposition of surplus Pu is needed to reduce reliance on

institutional controls and to provide visible evidence of irreversible disarmament. Therefore, a comprehensive long-term storage and disposition action is needed to ensure that weapons-usable fissile materials are properly managed and to prevent the potential increase of environmental, safety, and health risks. DOE also recognizes the need to strengthen national and international arms control efforts by providing a storage and disposition model for the international community. This action will enhance U.S. credibility and flexibility in negotiations on bilateral or multilateral reductions of surplus weapons-usable fissile material inventories.

## **SCOPE OF THE PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT**

The Storage and Disposition PEIS analyzes the direct, indirect, and cumulative environmental effects of reasonable alternatives for the long-term storage of nonsurplus Pu and HEU, the storage of surplus Pu and HEU pending disposition, and the disposition of surplus Pu. A separate DOE document, *Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement* (HEU EIS), addresses the disposition of surplus HEU. The HEU EIS (DOE/EIS-0240) was issued in June 1996, and the ROD published on August 5, 1996.

The Storage and Disposition PEIS includes analyses of storing 89 t (98 tons) of Pu and 994 t (1,093 tons) of HEU (reported in DOE's Openness Initiative referenced above). The PEIS also analyzes the disposition of a nominal 50 t (55.1 tons) of Pu, including the 38.2 t (42.1 tons) of Pu that has been declared surplus as well as Pu that may be declared surplus in the future (although the exact quantity of Pu that may be declared surplus is not known at this time). The locations of the surplus material in the DOE complex are shown in Figures S.1-2 and S.1-3.

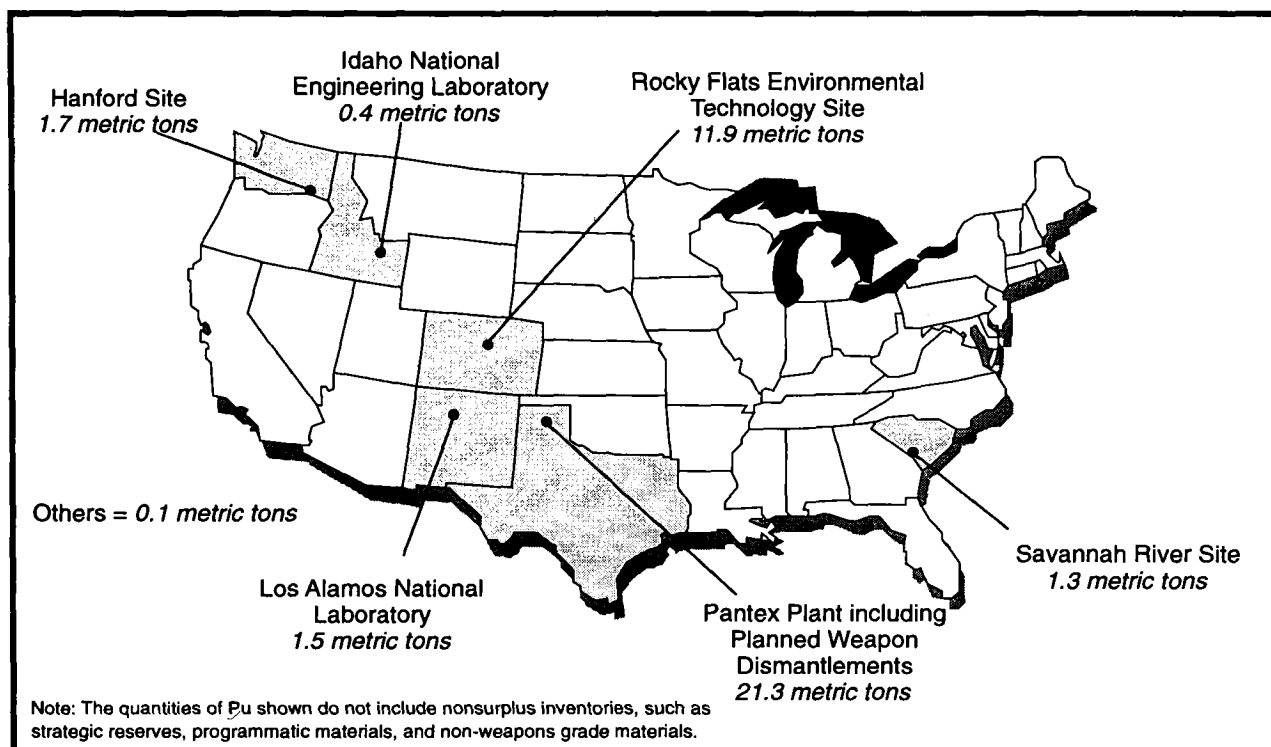
The Storage and Disposition PEIS assumes that the weapons-usable fissile material is in a stabilized form; the PEIS begins, as a starting point, after stabilization has been completed. DOE is currently in the process of stabilizing and repackaging weapons-usable fissile materials and placing them in safe, secure storage awaiting decisions on long-term storage and disposition. For Pu, this is being accomplished in accordance with the corrective actions identified in DOE's *Plutonium Vulnerability Management Plan* (DOE/EM-0199). This plan was developed in response to an assessment in DOE's *Plutonium Working Group Report* (DOE/EH-0415) and recommendations by the Defense Nuclear Facilities Safety Board (DNFSB) in DNFSB Recommendation 94-1. In addition, Pu materials will also meet the *Criteria for Safe Storage of Plutonium Metals and Oxides* (DOE-STD-3013-94), a DOE standard for long-term storage (at least 50 years) of these materials. Similarly, the HEU materials requiring long-term storage will meet criteria for safe storage of HEU metals and oxides; these criteria are under development at this time. Appropriate environmental documentation will be prepared, as necessary, for stabilizing and repackaging the Pu and HEU materials to meet respective long-term storage criteria.

Following the discontinuance of nuclear weapons material production, large quantities of residues remained as a result of the chemical and thermal processes used to separate and purify Pu. Examples of residue forms include some impure oxides and metals, halide salts, combustibles, ash, sludges, and contaminated glass. To meet requirements of DOE's *Plutonium Vulnerability Management Plan*, as well as various compliance agreements with State and local regulatory agencies, some Pu residues must be stabilized. As a result of the stabilization process, portions of the residues will potentially be concentrated and stored. These concentrates may be in a form and concentration (greater than 50 percent Pu by weight) that is weapons-usable and are therefore included in the PEIS.<sup>6</sup>

The Storage and Disposition PEIS pertains to weapons-usable fissile materials that meet all of the standards and criteria previously described. Fissile materials present in spent nuclear fuel or irradiated targets from reactors

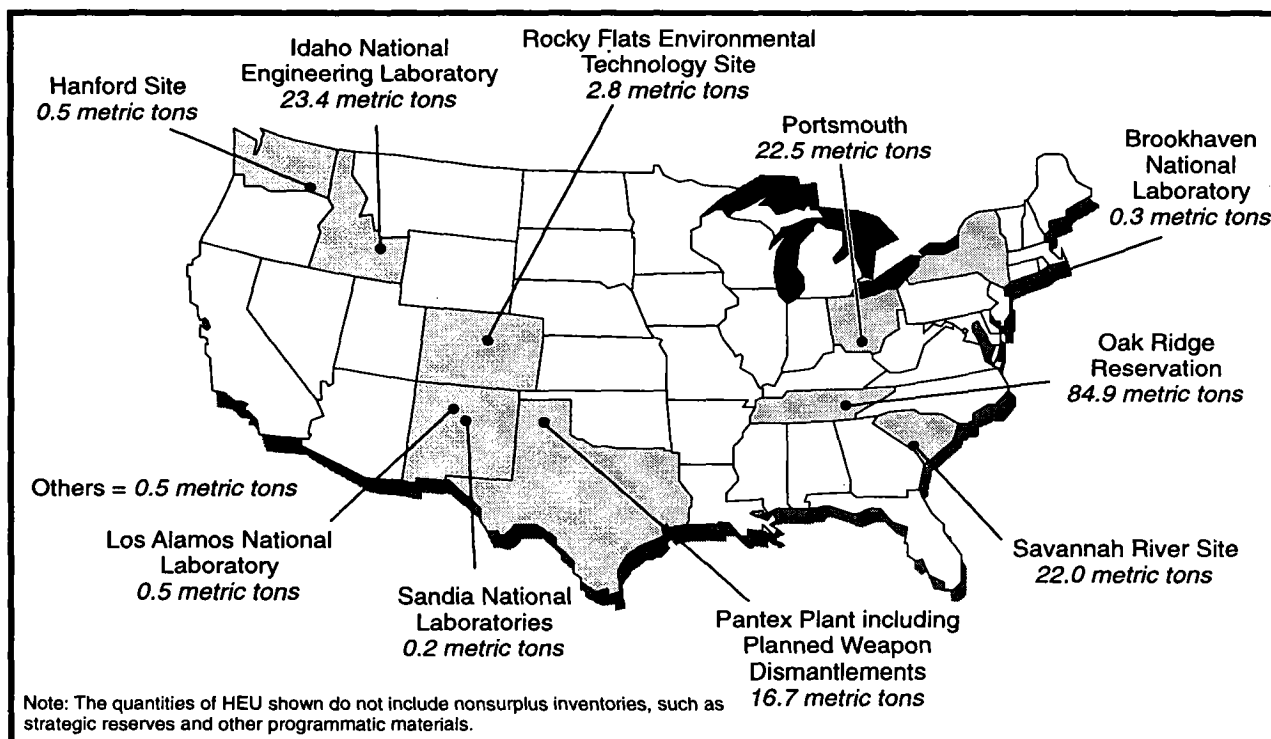
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<sup>6</sup> As a result of the stabilization process, there will also be non-weapons-usable Pu or HEU contaminated wastes or residues (less than 50 percent Pu by weight) that would not be within the scope of the PEIS. On November 19, 1996, DOE announced its intention to prepare an EIS on the *Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site* (61 FR 58866). This EIS will evaluate the potential environmental impacts associated with reasonable management alternatives for certain Pu residues and all scrub alloy currently stored at RFETS.



2679/FMD

**Figure S.1-2. Department of Energy Locations With Surplus Weapons-Grade Plutonium Inventories in September 1994.**



2680/FMD

**Figure S.1-3. Department of Energy Locations With Surplus Highly Enriched Uranium Inventories on February 6, 1996.**

are not covered in the PEIS; they are not considered weapons-usable because separation of the relevant isotopes from these highly radioactive materials requires significant remote chemical processing. Reprocessing and extraction of Pu from spent fuel is not proposed, and is beyond the scope and the fundamental nonproliferation purpose of the program covered by the PEIS.

#### **DECISIONS TO BE MADE**

The Storage and Disposition Draft PEIS was circulated for public review and comment from March 8 through June 7, 1996. Eight public meetings in the vicinity of DOE sites under consideration for the Proposed Action, and in Washington, DC, were held during the comment period. Approximately 8,700 comments were received from other Federal government agencies, State and local governments, Native American tribes, special interest groups, and the public. These comments, along with DOE's responses, became a part of the Final PEIS. DOE also made available for public review, the results of the technical, cost and schedule analyses in July and October 1996, as well as the nonproliferation analysis in November 1996. Along with the PEIS, these analyses will support a formal ROD regarding Pu and HEU storage and surplus Pu disposition. [Text deleted.] These decisions are as follows:

For storage:

- The strategy for long-term storage of nonsurplus weapons-usable Pu and nonsurplus HEU
- The strategy for storage of surplus Pu and surplus HEU pending disposition
- The storage site(s) and (if appropriate) facilities

For disposition:

- The strategy and technologies for disposition of surplus weapons-usable Pu

The Department, with interagency coordination, will then issue the ROD. Following the ROD, subsequent tiered and project-specific NEPA documents will be prepared. The tiered NEPA reviews will analyze alternative locations for disposition activities.

#### *Plutonium Immobilization*

A process that converts Pu to a chemically stable form for disposition. The forms analyzed in the PEIS include glass (through vitrification), ceramic (through ceramic immobilization), and glass-bonded zeolite (through electrometallurgical treatment).

#### *Mixed Oxide Fuel*

A blend of uranium dioxide [UO<sub>2</sub>] and plutonium dioxide [PuO<sub>2</sub>] that produces a fuel suitable for use in a nuclear reactor to generate electric power.